Patent Claims

Carrier for Structural Parts And Method for Producing Same

1. A carrier (10, 38, 100) for structural parts to be subjected to a heat-treatment process, including at least one frame (11, 40, 102, 104, 106, 108, 110) and a lattice (20, 50, 112, 114, 116, 118, 120) comprising intersecting strands extending therefrom, wherein the frame consists of one or more limbs (12, 14, 16, 18, 42, 44, 46, 48, 121, 122, 124, 125, 126, 128, 130, 132, 134, 136, 138, 140) preferably forming a polygon,
characterized in that
the frame (11, 40, 102, 104, 106, 108, 100) comprises temperature-resistant material and the strands which form the lattice (20, 50, 112, 114, 116, 118, 120) extending from the limb or limbs (12, 14, 18, 42, 44, 46, 48, 121, 122, 124, 125, 126, 128, 130, 132, 134, 136, 138, 140) of the frame comprises carbon fibers or ceramic fibers.

2. The carrier according to claim 1,
characterized in that
the carrier (100) comprises a plurality of frames (102, 104, 106, 108, 100) forming a three-dimensional body.

3. The carrier according to claim 2,
characterized in that
the three-dimensional body has a basket geometry.

4. The carrier according to claim 1, characterized in that the carbon fiber-reinforced carbon material or ceramic material forming the lattice (20, 50) is a fiber bundle in the form of single-layer or multilayer fiber strands or intertwined yarns and that the fiber bundle extends in a warp and woof web structure between the limbs (12, 14, 16, 18, 42, 44, 46, 48) of the frame.

5. The carrier according to at least claim 1 or claim 4, characterized in that the lattice (20, 50) is formed by a section of an endless fiber bundle extending between the limbs (12, 14, 16, 18, 42, 44, 46, 48) of the frame.

6. The carrier according to at least claim 1, characterized in that the limbs (12, 14, 16, 18) have, in their respective longitudinal edges, recesses through which extend sections of the fiber bundle for extending the lattice (20, 50).

7. The carrier according to claim 6, characterized in that the recesses form a comb-like geometry in the respective longitudinal edge (24, 26, 28, 30) of the frame limb (12, 14, 16, 18).

8. The carrier according to at least claim 1, characterized in that the limbs (42, 44, 46, 48) of the frame (40) have openings, such as borings (52, 54), through which the fiber bundle passes.

9. The carrier according to at least claim 4, characterized in that the fiber bundle, laid in the web structure, extends under tension between the limbs (12, 14, 16, 18, 42, 44, 46, 48).

10. The carrier according to at least claim 1, characterized in that the frame (11, 52) is integrally cut out of a carbon fiber-reinforced carbon plate.

11. The carrier according to at least claim 1, characterized in that the limbs (42, 44, 46, 48) forming the frame (40) are joined together by means of plug-in connections.

12. The carrier according to at least claim 1, characterized in that the base of the frame (11, 38) or its limbs (12, 14, 16, 18, 42, 44, 46, 48) is a pyrolyzed fiber preform produced by means of TFP technology.

13. The carrier according to at least claim 1, characterized in that the frame (11, 40) consists of a section or sections severed, in particular by means of water jet cutting, from a carbon fiber-reinforced carbon plate, such as a CFC plate.

14. The carrier according to at least claim 1, characterized in that the lattice (20, 50) is produced by means of a TFP method.

15. The carrier according to at least claim 1, characterized in that the fiber material consists of or contains Al_2O_3 and/or SiC and/or BN and/or C.

16. The carrier according to at least claim 1, characterized in that the lattice (20, 50) has a matrix which consists of or contains carbon, B_4C, Al_2O_3, SiC, Si_3N_4 and/or mullite.

17. The carrier according to claim 16, characterized in that the matrix is separated from the gas phase and/or formed by pyrolysis of a precursor material.

18. The carrier according to claim 17, characterized in that the precursor material is phenolic resin and/or furan resin and/or a Si precursor.

19. The carrier according to at least claim 1, characterized in that at least the lattice has a coating of, or contains, oxides, nitrides and/or carbides of the third and fourth main group and/or the third to sixth subgroup of the periodic system and/or carbon.

20. The carrier according to at least claim 1, characterized in that the frame (11, 40) consists of carbon fiber-reinforced carbon, fiber ceramic or graphite.

21. The carrier according to at least claim 1, characterized in that the carrier (100) has a parallelepiped geometry open on one side with bottom and side frames (102, 104, 106, 108, 110) which are each holders for a lattice (112, 114, 116, 118, 120).

22. The carrier according to at least claim 21, characterized in that the upper limb (121, 122, 124, 125) of each side frame (112, 114, 116, 118) is a flat element and/or the lower limb (126, 128, 130, 132) of each side frame is an angular element and/or the side limbs (134, 136, 138, 140) extending at a right angle thereto are each a round element.

23. The carrier according to at least claim 22, characterized in that the flat element forms, with its flat side, a plane in which, or approximately in which, extends the lattice (112, 114, 116, 118) stretched out by the frame (102, 104, 106, 108) extends.

24. The carrier according to at least claim 22, characterized in that the respective flat element (121, 122, 124, 125) of the side frame (112, 114, 116, 118), at the outer longitudinal edge side, extends in a flush manner into the respective front end of a round element (134, 136, 138, 140).

25. The carrier according to at least claim 22, characterized in that adjoining flat elements of frames (102, 104, 106, 108)

abutting one another at a right angle, or approximately at a right angle, are connected by a plug-in connection which, in turn, extends into one of the round elements (134, 136, 138, 140).

26. A method for producing a component consisting of intersecting strands of carbon fibers or ceramic fibers using a frame composed of one or more limbs, from which the strands having the desired lattice structure are correspondingly extended, a matrix is then inserted into the fibers and the lattice is subsequently removed from the frame.

27. The method according to claim 26,
characterized in that
the lattice is separated, e.g. severed, from its sections extending from the frame.

28. The method according to claim 26,
characterized in that
the matrix is separated from the gas phase and/or formed by pyrolysis of one or more precursor materials.

29. The method according to claim 27,
characterized in that
the lattice is surface-coated prior to and/or after removal of the lattice from the frame.

30. The method according to at least claim 26,
characterized in that
Al_2O_3 and/or SiC and/or BN and/or C is used as the fibers or fiber material.

31. The method according to at least claim 26, characterized in that carbon and/or B_4C and/or Al_2O_3 and/or SiC and/or Si_3N_4 and/or mullite is used as matrix material.

32. The method according to at least claim 26, characterized in that the lattice is surface-coated with oxides, nitrides and/or carbides of the third and fourth main group and/or the third to sixth subgroup of the periodic system and/or carbon.

33. A lattice or method for producing a lattice according to one of the claims 1 to 32.